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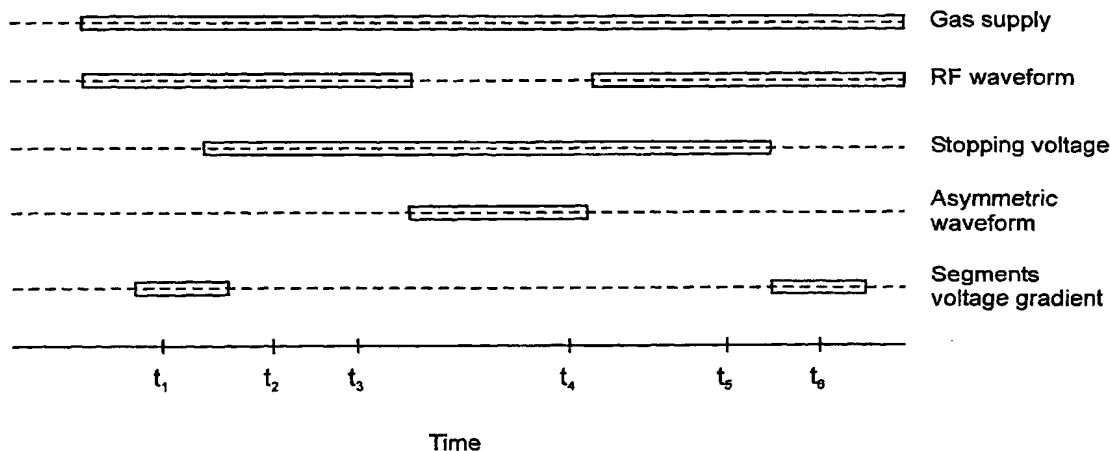
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted
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AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES,
FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
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ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU,
TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE,

[Continued on next page]

(54) Title: FAIMS APPARATUS AND METHOD FOR SEPARATING IONS IN THE GAS PHASE



(57) Abstract: A high field asymmetric waveform ion mobility spectrometer (FAIMS) and method for separating ions in the gas phase, the apparatus includes a set of spaced-apart parallel rods, the space between the parallel rods having first and second ends and defines an analyzer region. The apparatus includes an electrical controller for electrically coupling to the set of parallel rods, for applying at least an rf-voltage between the parallel rods of the set of parallel rods in a first operating mode and for applying a combination of an asymmetric waveform voltage and a direct current voltage between the parallel rods of the set of parallel rods in a second operating mode.



DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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A. CLASSIFICATION OF SUBJECT MATTER
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B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01 69647 A (GUEVREMONT ROGER ;NAT RES COUNCIL CANADA (CA)) 20 September 2001 (2001-09-20) cited in the application page 16, line 30 -page 19, line 14; figures 3,5-8	1-6,8, 11,12, 14, 20-22, 25,28
A	WO 01 69221 A (BARNETT DAVID ;PURVES RANDY (CA); GUEVREMONT ROGER (CA); NAT RES C) 20 September 2001 (2001-09-20) page 32, line 29 -page 35, line 2; figure 11	15,16, 23,24
A	US 2002/070338 A1 (LOBODA ALEXANDER V) 13 June 2002 (2002-06-13) paragraph '0118!; claim 22; figure 1 -/--	7,9,10

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GUEVREMONT R ET AL: "Ion trapping at atmospheric pressure (760 Torr) and room temperature with a high-field asymmetric waveform ion mobility spectrometer" INTERNATIONAL JOURNAL OF MASS SPECTROMETRY, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 193, no. 1, 28 October 1999 (1999-10-28), pages 45-56, XP004365756 ISSN: 1387-3806 the whole document</p> <p>----</p>	14,22, 26,27
A	<p>EICEMAN G A: "Ion-mobility spectrometry as a fast monitor of chemical composition" TRAC, TRENDS IN ANALYTICAL CHEMISTRY, ANALYTICAL CHEMISTRY. CAMBRIDGE, GB, vol. 21, no. 4, April 2002 (2002-04), pages 259-275, XP004371244 ISSN: 0165-9936 the whole document</p> <p>----</p>	1-28
A	<p>BURYAKOV I A ET AL: "A NEW METHOD OF SEPARATION OF MULTI-ATOMIC IONS BY MOBILITY AT ATMOSPHERIC PRESSURE USING A HIGH-FREQUENCY AMPLITUDE-ASYMMETRIC STRONG ELECTRIC FIELD" INTERNATIONAL JOURNAL OF MASS SPECTROMETRY AND ION PROCESSES, ELSEVIER SCIENTIFIC PUBLISHING CO. AMSTERDAM, NL, vol. 128, 1993, pages 143-148, XP000865595 ISSN: 0168-1176 the whole document</p> <p>-----</p>	1-28

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 03/01445

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0169647	A	20-09-2001	AU 3907201 A	24-09-2001
			AU 3907301 A	24-09-2001
			AU 3907401 A	24-09-2001
			AU 3907501 A	24-09-2001
			AU 3907601 A	24-09-2001
			AU 4213701 A	24-09-2001
			AU 4213801 A	24-09-2001
			AU 4213901 A	24-09-2001
			WO 0169216 A2	20-09-2001
			WO 0169217 A2	20-09-2001
			WO 0169646 A2	20-09-2001
			WO 0169218 A2	20-09-2001
			WO 0169219 A2	20-09-2001
			WO 0169220 A2	20-09-2001
			WO 0169647 A2	20-09-2001
			WO 0169221 A2	20-09-2001
			CA 2401722 A1	20-09-2001
			CA 2401735 A1	20-09-2001
			CA 2401772 A1	20-09-2001
			CA 2401802 A1	20-09-2001
			CA 2402628 A1	20-09-2001
			CA 2402793 A1	20-09-2001
			CA 2402798 A1	20-09-2001
			CA 2402812 A1	20-09-2001
			EP 1266395 A2	18-12-2002
			EP 1273029 A2	08-01-2003
			EP 1266393 A2	18-12-2002
			EP 1266209 A2	18-12-2002
			EP 1266394 A2	18-12-2002
			JP 2003527734 T	16-09-2003
			US 2003047681 A1	13-03-2003
			US 2003089847 A1	15-05-2003
			US 2003057369 A1	27-03-2003
			US 2003020012 A1	30-01-2003
			US 2003089849 A1	15-05-2003
			US 2003057367 A1	27-03-2003
			US 2003150985 A1	14-08-2003
			US 2003038235 A1	27-02-2003
WO 0169221	A	20-09-2001	AU 3907201 A	24-09-2001
			AU 3907301 A	24-09-2001
			AU 3907401 A	24-09-2001
			AU 3907501 A	24-09-2001
			AU 3907601 A	24-09-2001
			AU 4213701 A	24-09-2001
			AU 4213801 A	24-09-2001
			AU 4213901 A	24-09-2001
			WO 0169216 A2	20-09-2001
			WO 0169217 A2	20-09-2001
			WO 0169646 A2	20-09-2001
			WO 0169218 A2	20-09-2001
			WO 0169219 A2	20-09-2001
			WO 0169220 A2	20-09-2001
			WO 0169647 A2	20-09-2001
			WO 0169221 A2	20-09-2001
			CA 2401722 A1	20-09-2001
			CA 2401735 A1	20-09-2001
			CA 2401772 A1	20-09-2001

INTERNATIONAL SEARCH REPORT

Information on patent family members

Application No
PCT/CA 03/01445

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0169221	A	CA 2401802 A1	20-09-2001
		CA 2402628 A1	20-09-2001
		CA 2402793 A1	20-09-2001
		CA 2402798 A1	20-09-2001
		CA 2402812 A1	20-09-2001
		EP 1266395 A2	18-12-2002
		EP 1273029 A2	08-01-2003
		EP 1266393 A2	18-12-2002
		EP 1266209 A2	18-12-2002
		EP 1266394 A2	18-12-2002
		JP 2003527734 T	16-09-2003
		US 2003047681 A1	13-03-2003
		US 2003089847 A1	15-05-2003
		US 2003057369 A1	27-03-2003
		US 2003020012 A1	30-01-2003
		US 2003089849 A1	15-05-2003
		US 2003057367 A1	27-03-2003
		US 2003150985 A1	14-08-2003
		US 2003038235 A1	27-02-2003
US 2002070338	A1	13-06-2002 CA 2364676 A1	08-06-2002